

Land Use

Q: What are the trends in land use and their effects on human health and the environment?

The above question pertains to all 'Land Use' Indicators, however, the information on these pages (overview, graphics, references and metadata) relates specifically to "Land Use". Use the right side drop list to view the other related indicators on this question.

Introduction

Land use is the purpose of human activity on the land. Unlike land cover, land use may not always be visible. For example, a unit of land designated for use as timberland may appear identical to an adjacent unit of protected forestland or, if recently harvested, may appear not to be in forest land cover at all. Land use is generally designated through zoning or regulation and is one of the most obvious effects of human inhabitation of the planet. It can affect both human health and ecological systems, for example by changing the hydrologic characteristics of a watershed, the potential of land to erode, the condition or contiguity of plant and animal habitat, or the spread of vector-borne diseases.

This indicator tracks trends in acreages of major land uses over the 1977-2003 period using several data sources. These sources do not always cover the same time period, sample the same resource or geography, or use the same definitions, but each of them provides an important piece of the land use picture over time. Definitions for the various land use categories in this indicator can be found in the text box.

The National Resources Inventory (NRI) conducted by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service was used to track trends in “crop and pasture” land (row crop, orchard, and pasture uses) and “developed” land (residential, commercial, industrial, and transportation uses). The NRI developed estimates every 5 years on non-federal lands in the contiguous U.S. between 1977 and 1997, and annual estimates based on a smaller sample size beginning in 2001.

The Forest Inventory and Analysis (FIA) surveys conducted by the USDA Forest Service were used to track trends in forest and timberlands. The FIA surveys include both private and public land in all 50 states. The FIA previously assessed forest and timberland acreage every 10 years, but the data are now updated on a rolling basis using surveys that sample a different portion of FIA sites every year.

The USDA National Agricultural Statistics Service (NASS) Census of Agriculture was used to track trends in the extent of cropland, cropland used only for pasture, pastureland, and rangeland. NASS data are available for 1997 and 2002 only. Data on the extent of grass and forested rangeland (typically “unimproved” grazing land) are available from the USDA Economic Research Service (ERS) for 5-year intervals from 1982 through 2002.

What The Data Show

The acreage of lands used for growing food and forage crops has declined since 1982, while developed land has increased and timberland has remained approximately constant (Exhibit 4-5). As of 2002-2003, estimates from both the NRI (2003 data) and the NASS (2002 data) indicate that between 368 and 374 million acres were used for food crop production, approximately 16 percent of the U.S. land area. Estimates of pasture or land used to support forage for livestock vary, depending

on the definitions. The NRI classifies 117 million acres as pasture, while the NASS classifies about 61 million acres as cropland used for pasture. The NASS classifies more than 395 million additional acres as pasture or rangeland for grazing. The broader ERS estimate of land available for grazing totals about 587 million acres, and includes grassland and other non-forested pasture and range. If forest lands used for grazing are also included, the total ERS estimate for these lands is 721 million acres for 2002. The NASS shows a decrease in the extent of cropland (5 million acres), cropland pasture (6 million acres), and pastureland and rangeland (3 million acres) between 1997 and 2002. The NRI data suggest that these declines are part of a longer trend, with NRI cropland and pasture declining by slightly more than 66 million acres (12 percent) between 1982 and 2003. ERS data also show a downward trend for pasture and rangeland between 1982 and 2002, with the largest decrease being a 24-million-acre (15 percent) decline in forest land used for grazing.

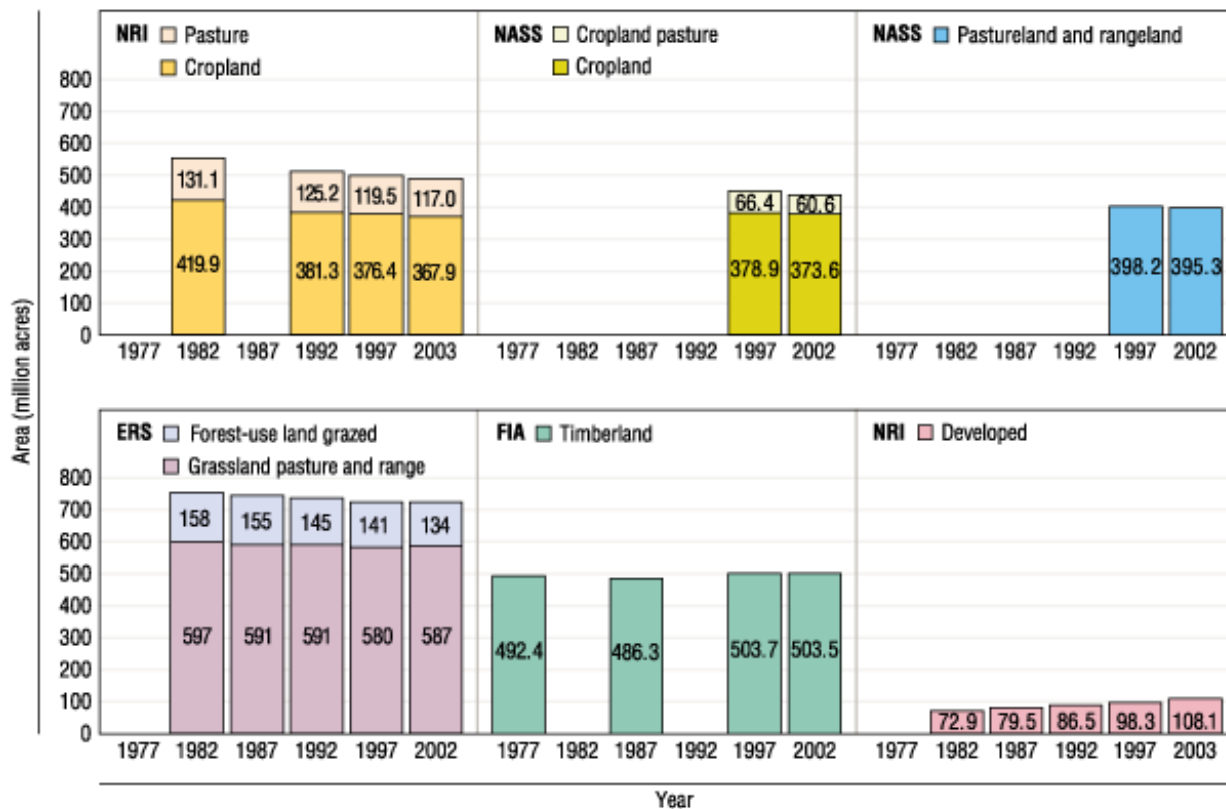
According to the NRI, 5 percent (108.1 million acres) of U.S. land area was considered developed¹ as of 2003 (Exhibit 4-5). This represents a gain of 48 percent (35.2 million acres) since 1982. While the amount of developed land is a small fraction of the total, its ecological impact can be disproportionately high relative to other land use types. Paving and the creation of other impervious surfaces can change local hydrology, climate, and carbon cycling, leading to increased surface runoff, pollution, and degradation of wetlands and riparian zones.

Forest lands are managed by a complex array of interests to meet multiple purposes, including providing habitat for a variety of species, recreation, and timber production. While forest is a land *cover* classification, timberland is a land *use* classification that reflects forest land capable of producing at least 20 cubic feet per acre per year of industrial wood and not withdrawn from timber utilization by statute or regulation. Approximately 504 million acres of U.S. forest land, or 22 percent of the total U.S. land area, qualified as timberland in 2002 (Exhibit 4-5). This total reflects a net gain of about 11 million acres (2 percent) between 1977 and 2002, which the FIA attributes largely to reversion of abandoned lands and reclassification of some National Forest lands to align with classifications used on other land ownerships (Smith et al., 2004).

Land use varies widely by EPA Region (Exhibit 4-6). According to the most recent data for each land use type, Regions 6, 8, and 9 together have more than three-quarters of the nation's grazing land, while Region 4 has the largest portion of timberland (27 percent of total U.S. timberland). Trends also vary widely among regions. About 83 percent of the cropland lost between 1987 and 2003 was in five EPA Regions (Regions 4, 5, 6, 7, and 8) (Exhibit 4-7, panel A). Increases in developed land are responsible for part of this decline; for example, developed land increased by nearly 60 percent from 1987 to 2003 in Region 4 (Exhibit 4-7, panel B). Other factors include the federal Conservation Reserve Program, which has assisted private landowners in converting about 35 million acres of highly erodible cropland to vegetative cover since 1985 (as of 2004) (USDA Farm Service Agency, 2004).

[\[Definitions of Land Use Categories for Exhibits 4-5, 4-6, and 4-7\]](#)

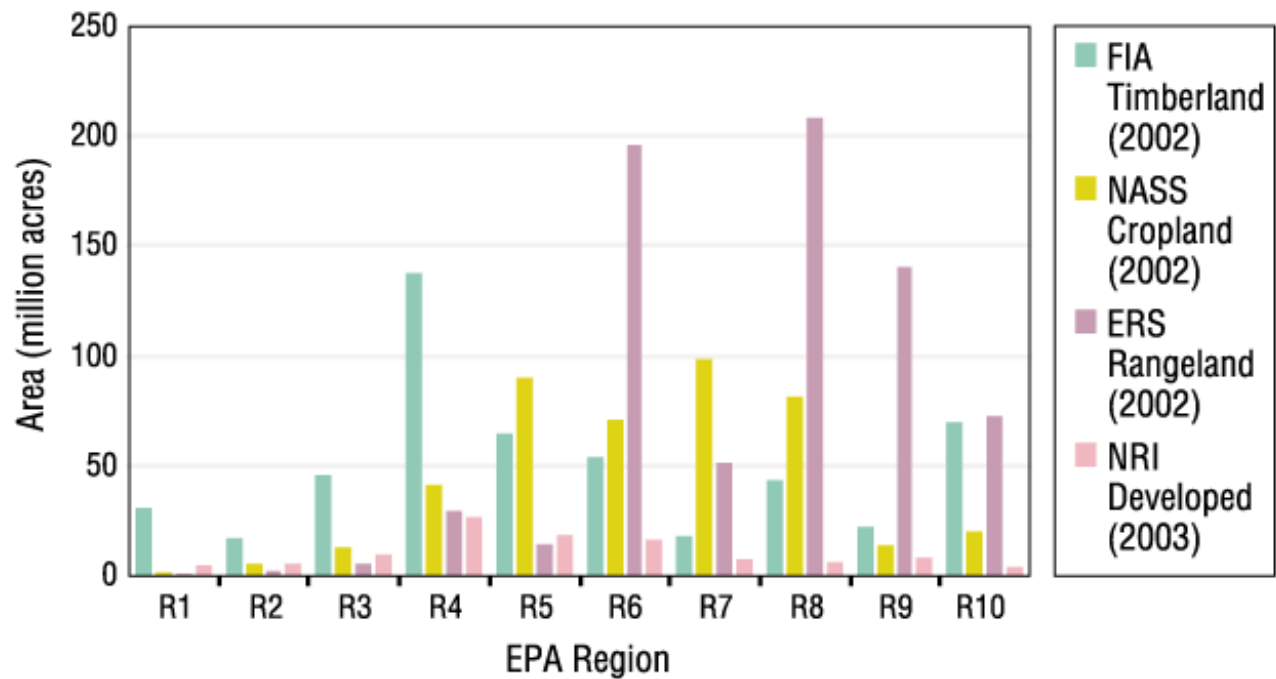
Exhibit 4-5. Land use trends in the U.S., 1977-2003^a



^aSee box in text for definitions of land use categories.

Data source: Lubowski et al., 2006; Smith et al., 2004; USDA NASS, 2004; USDA NRCS, 2007

Exhibit 4-6. Land use in the U.S. by EPA Region, 2002-2003^a

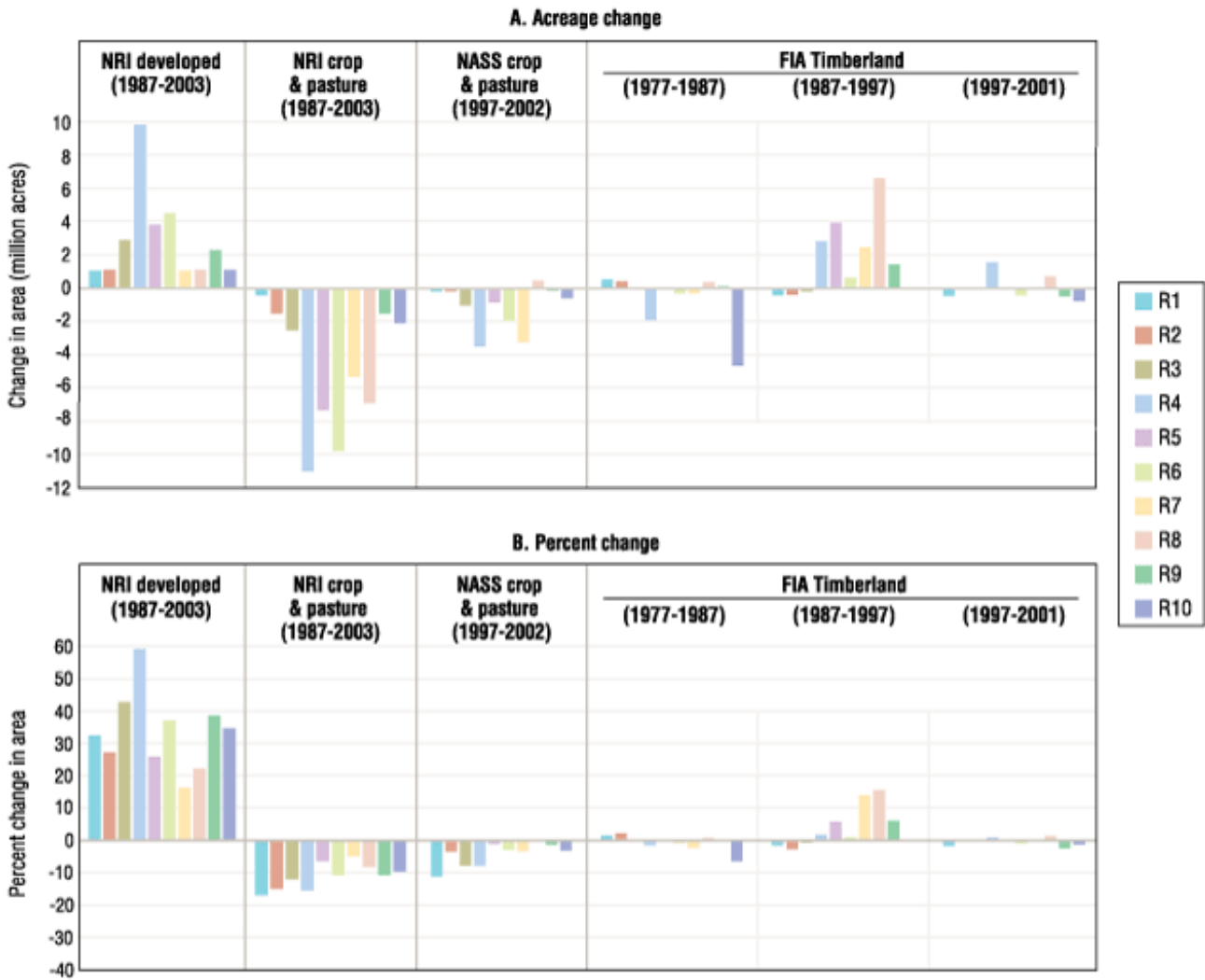


^aSee box in text for definitions of land use categories.

Data source: Lubowski et al., 2006; Smith et al., 2004; USDA NASS, 2004; USDA NRCS, 2007



Exhibit 4-7. Changes in land use in the U.S. by EPA Region, 1977-2003^a

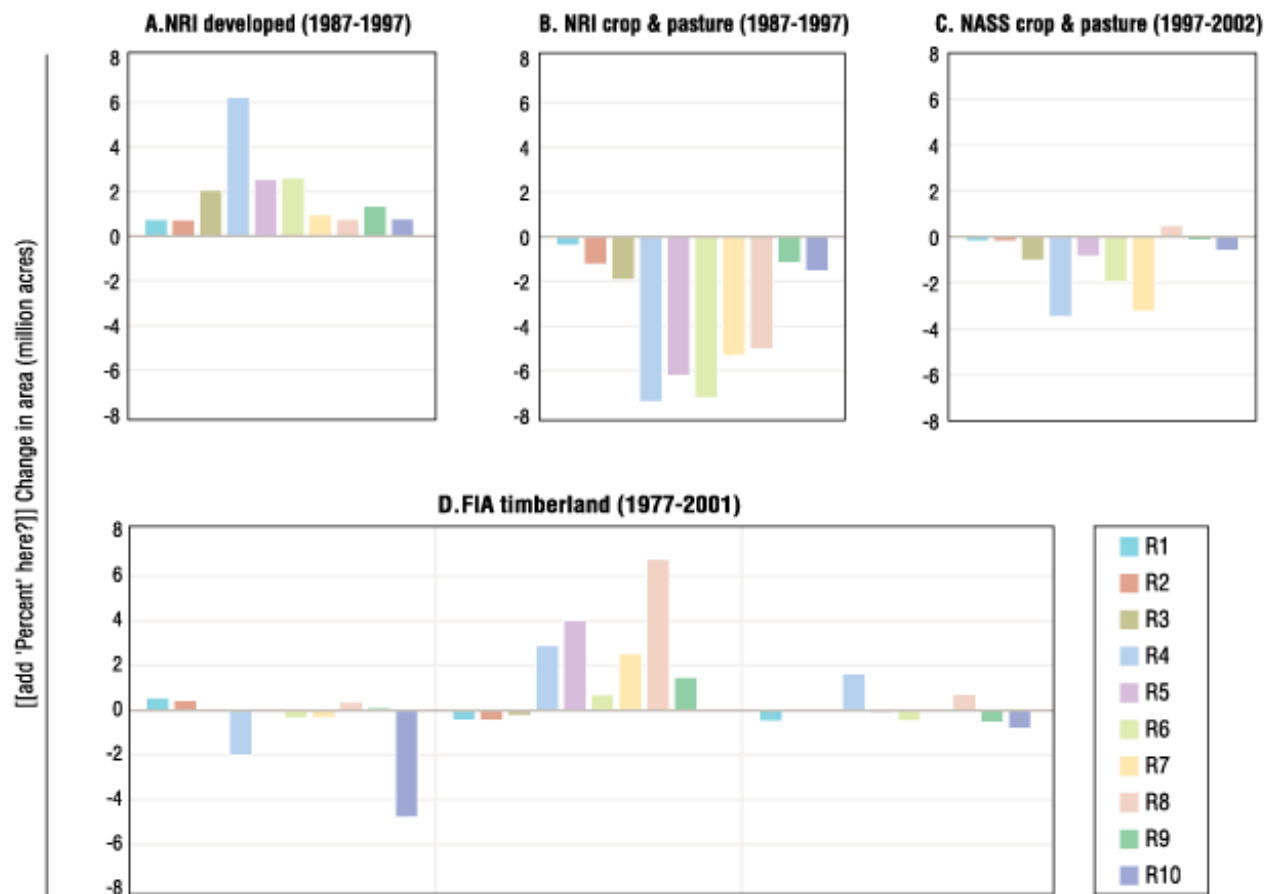


^aSee box in text for definitions of land use categories.

Data source: Smith *et al.*, 2004; USDA NASS, 2004; USDA NRCS, 2007



Exhibit 4-7a. Change in land use in the U.S., by EPA Region, 1977-2001^a

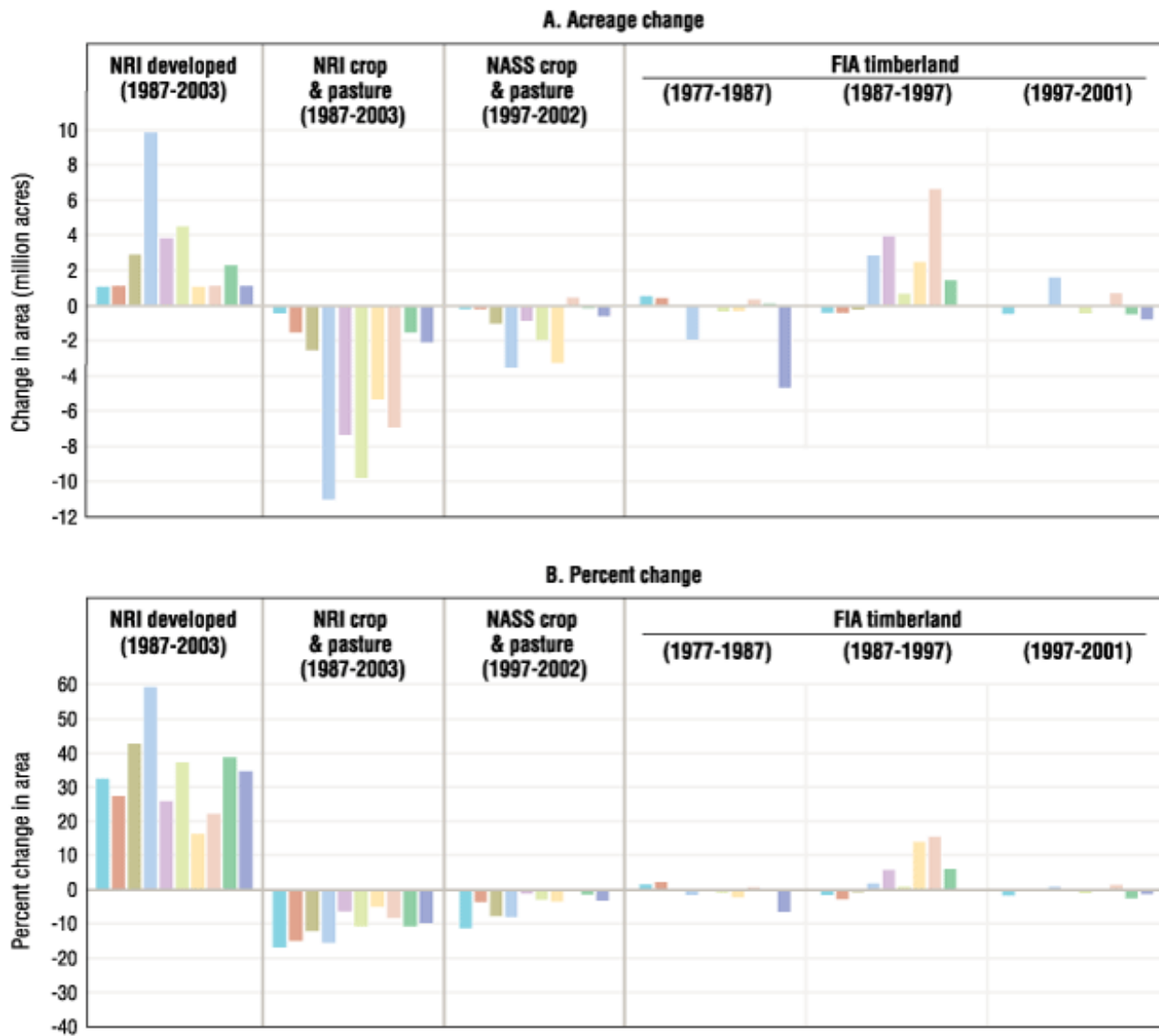


^aSee text box on page x-xx for definitions of land use categories.

Data source: FIA data from the USDA Forest Service, Forest Inventory and Analysis (FIA) Program and from Smith et al., 2004. NASS data from USDA, 2004. NRI data from the USDA Natural Resources Conservation Service and from USDA, 2000. Data also reported in Heinz Center, 2005.



Exhibit 4-7. Changes in land use in the U.S. by EPA Region, 1977-2003^a



^aSee box in text for definitions of land use categories.

Data source: Smith et al., 2004; USDA NASS, 2004; USDA NRCS, 2007

Limitations

- Estimates are derived from a variety of inventories and samples, conducted over different time periods and for different purposes. This limits the ability to integrate the data and track changes over time.
- The NRI does not report land use data for Alaska, which encompasses 365 million acres of the

2.3 billion acres nationwide. The NRI also does not provide data on federal lands (representing 20 percent of the contiguous U.S. land and one-third of Alaska). Because federal land is seldom used for agriculture or urban development, and there is relatively little developed or agricultural land in Alaska, the NRI data likely offer a reasonable approximation of national trends in these categories.

- NRI data use three subcategories of types of developed land: large built-up areas, small built-up areas, and rural transportation land. Because ecological effects from developed land depend on the density of development and many other factors, the limited NRI categories are not discriminating enough to support detailed analyses of ecological effects of developed land.
- The FIA data are aggregated from state inventories in many cases, and dates of data collection for these inventories vary by state—for example, ranging from 1980 to 2001 for reporting 2002 estimates.
- Some land uses may be administratively designated but not physically visible (e.g., lands that are reserved for parks or wilderness may appear similar to lands that are managed for natural resources).
- Land use designations are most frequently managed and monitored by local governments, each using different approaches and classifications. This makes national summaries difficult.
- The extent of lands used for energy production, resource extraction, or mining is not known and represents a data gap.
- Lands specifically protected for certain uses such as wilderness or parks have been periodically inventoried for the nation. These statistics are currently not reported in a form that allows comparison with other statistics.

Data Sources

Data were obtained from several original sources and compiled by EPA Region. ERS data were obtained from Lubowski et al. (2006). FIA data were obtained from Smith et al. (2004). NASS data were published by the USDA National Agricultural Statistics Service (2004).

References

Lubowski, R.N., M. Vesterby, S. Bucholtz, A. Baez, and M.J. Roberts. 2006. Major uses of land in the United States, 2002. Economic Information Bulletin No. (EIB-14). U.S. Department of Agriculture, Economic Research Service. <http://www.ers.usda.gov/publications/eib14/>

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<http://www.nrcs.usda.gov/technical/NRI/2002/glossary.html>

¹ The land *use* classification for developed land uses NRI data and is considerably different from the land *cover* classification for developed land, which uses NLCD data. See Section 4.2 for more information.